

Rules for Ergonomic Container Lashing

July 2020



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Register

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A guide to the Rules

and published requirements

Rules for Ergonomic Container Lashing

Introduction

The Rules are published as a complete set.

Rules updating

The Rules are published periodically and changed through a system of Notices between releases.

PLEASE NOTE: No technical changes have been made to this Rule set, only the date has been updated.

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CHAPTER 1 RULES FOR ERGONOMIC CONTAINER LASHING

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■ **Section 1**

General

1.1 General

1.1.1 These Rules are applicable where an optional class notation for the ergonomic lashing of containers is requested and are additional to those applicable in other Parts of the *Rules and Regulations for the Classification of Ships, July 2020*.

1.1.2 These Rules specify the requirements for working spaces, movement about the ship, fall protection and working arrangements on deck with the purpose of providing both crew and port workers with safe working arrangements when performing container securing, inspection and other related tasks.

1.1.3 These Rules address ship design and equipment design and selection covering the general areas addressed in Sections 6 and 8 of IMO MSC.1/Circular.1352/Rev.1 – *Amendments to the Code of Safe Practice for Cargo Stowage and Securing (CSS Code)* – (15 December 2014) *The Annex of this document has been consolidated into CSS Code*. Other requirements of Circ. 1352, including operational aspects and the periodic inspection and maintenance of loose container securing fittings, are not addressed here but need to be considered in order to ensure safe and effective operation and, where appropriate, to satisfy the requirements of the Flag Administration.

1.1.4 These Rules should be read in association with Pt 3, Ch 14 *Cargo Securing Arrangements* of the *Rules and Regulations for the Classification of Ships, July 2020*.

1.2 Class notations

1.2.1 These Rules are applicable to container ships. In addition, they may be applied to other ships for which arrangements are specifically designed and fitted for the purpose of carrying containers on deck.

1.2.2 A ship designed to carry containers that is provided with safe access and securing arrangements in accordance with these requirements will be eligible to be assigned the special features notation **ECL** (Ergonomic Container Lashing), with supplementary descriptors as follows:

ECL(1) Meets the minimum requirements for assignment of the notation, in accordance with Ch 1, 1 General and Ch 1, 2 *Requirements for assignment of ECL(1)* of these Rules. ECL(1) provides the LR interpretation of IMO MSC.1/Circular.1352/Rev.1 – *Amendments to the Code of Safe Practice for Cargo Stowage and Securing (CSS Code)* – (15 December 2014) *The Annex of this document has been consolidated into CSS Code*, Sections 6 and 8, which LR considers it is practicable to apply to existing ships.

ECL(2) Meets the requirements for ECL(1) and some additional requirements defined in Ch 1, 3 *Requirements for assignment of ECL(2)* of these Rules. ECL(2) provides the LR interpretation of IMO MSC.1/Circular.1352/Rev.1 – *Amendments to the Code of Safe Practice for Cargo Stowage and Securing (CSS Code)* – (15 December 2014) *The Annex of this document has been consolidated into CSS Code*, Sections 6 and 8 primarily for application to new ships.

ECL(3) Meets in full all of the requirements of these Rules, in accordance with Ch 1, 1 General, Ch 1, 2 *Requirements for assignment of ECL(1)*, Ch 1, 3 *Requirements for assignment of ECL(2)* and Ch 1, 4 *Requirements for assignment of ECL(3)*. Intended primarily for application to new ships, ECL(3) contains some additional ergonomic and safety related requirements which are beyond the requirements of IMO MSC.1/Circular.1352/Rev.1 – *Amendments to the Code of Safe Practice for Cargo Stowage and Securing (CSS Code)* – (15 December 2014) *The Annex of this document has been consolidated into CSS Code*.

1.3 Definitions

1.3.1 CSM: Cargo Securing Manual, as defined in *MSC.1/Circular.1353/Rev.1 – Revised Guidelines for the Preparation of the Cargo Securing Manual – (15 December 2014)*.

1.3.2 CSAP: Cargo Safe Access Plan, as defined in *MSC.1/Circular.1353/Rev.1 – Revised Guidelines for the Preparation of the Cargo Securing Manual – (15 December 2014)*.

1.3.3 Securing arrangements: the arrangement of lashing rods, twistlocks, deck fittings, etc. as described in the CSM.

1.3.4 Lashing equipment: items such as lashing plates, lashing rods, turnbuckles and twistlocks.

1.3.5 Fencing: the guardrails, handrails, safety rails, toeboards, safety barriers and similar structures that provide protection against the fall of persons.

1.3.6 Stanchions: the vertical supports of fencing.

1.3.7 Stringers: the uprights or sides of a ladder.

1.3.8 Pedestal: pillar type structure to support container stacks. Generally at the outboard sides of a vessel; the top is usually at the same height as the adjacent hatch cover.

1.3.9 Lashing positions: including positions in between container stows on and adjacent to hatch covers; at the end of hatches; on lashing bridges; on pedestals; outboard lashing positions on hatch covers; and any other position where people work with container securing.

1.4 General principles

1.4.1 The requirements of the following Sections are based on consideration of the following principles:

- The design is to consider the tasks to be performed, the persons who will carry them out, the location of the work, the working environment and the equipment to be used.
- The design is to reduce the risk of slips, trips and falls on the level, falls from height, injuries whilst manually handling lashing gear, being struck by falling lashing equipment and electrical risks.
- The design is to provide protection against falls from height. Locations where protection should be provided include working platforms, pedestals, walkways and transit areas, ladders and openings, including access openings.
- The design is to reduce the risk of work-related Musculoskeletal Disorders (MSDs).
- Working areas, particularly at hatch cover ends and outer positions, should be provided with a platform on which to work safely. The platform should have fencing and should be at an appropriate height to allow lashing tasks to be performed without climbing or excessive reaching, stretching or bending.
- The design is to provide sufficient working areas clear of obstructions to perform the securing tasks, including handling of the lashing rods and tightening of the turnbuckles, with allowance for team working and supervision.
- The design is to provide access to containers stacked on deck to check securing arrangements.
- Account is to be taken of the practical abilities of workers to lift, reach, hold, control and connect the lashing components in all situations anticipated in the cargo securing plan.
- The components of lashing equipment are to be compatible with each other and suitable for the application. The weight of lashing rods and turnbuckles should be minimized consistent with the necessary mechanical strength. The heads of lashing rods should be designed so that the rod cannot disengage from the container corner fitting accidentally.
- The orientation (locked/unlocked) of twistlocks is to be readily apparent in operational situations. They are not to be easily dislodged or unlocked due to operational motion. Unlocking poles are to be lightweight and easy to use.
- Working on the top of containers is to be avoided. Where it is unavoidable, a safe means of access is to be provided. This may be provided by the container cargo operation terminal.
- Where it is not feasible to eliminate working on the tops of container stows, the twistlock design should minimize the need for such working, for example by the use of semi-automatic twistlocks, fully automatic twistlocks or similar design.

1.5 Container stowage and securing arrangements

1.5.1 Stowage and securing arrangements are to comply with the requirements of these Rules for all intended container stowage arrangements.

1.5.2 Provision for the securing of non-standard containers is to be included where these are permitted in the design of the ship.

1.5.3 Any restrictions in container stowage and securing arrangements that are incompatible with safe working are to be clearly identified in the CSM or CSAP as appropriate.

1.5.4 Reefer container locations are to allow safe access for connection and monitoring.

■ **Section 2**
Requirements for assignment of ECL(1)

2.1 General

2.1.1 A ship designed to carry containers that is provided with safe access and securing arrangements in accordance with the requirements of Sections 1 and 2 of these Rules will be eligible to be assigned the special features notation **ECL(1)**.

2.2 Working areas

2.2.1 Dimensions of working areas are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

2.2.2 Access to working areas is to be in accordance with the requirements for access and movement about the ship as defined in these Rules.

2.2.3 Isolated pedestals for outboard container fixing are not generally acceptable as places to perform securing tasks. Where possible, a fixed platform is to be provided to enable access to the pedestal from the adjacent hatch cover, see *Figure 1.5.3 Outboard working area*. Where this is not possible, isolated pedestals may be accepted provided they have adequate access, fall protection and work platforms.

2.2.4 Working areas are to provide a firm and level working surface. Trip hazards, where unavoidable, are to be clearly marked, see *Ch 1, 2.6 Signs and indications*.

2.2.5 Where lashing is from the hatch cover, a suitable platform should be provided, where practicable, preferably at the same level as the top of the hatch cover.

2.2.6 Working areas are to have anti-slip surfaces or coatings.

2.3 Fall protection

2.3.1 Openings and edges into, through or over which a person may fall are to be fitted with fall protection.

2.3.2 Where fall protection is required, any horizontal gaps in fall protection are not to exceed 300 mm.

2.3.3 Any openings in lashing positions through which people can fall should be possible to be closed on all occasions when it is necessary to access the lashing position.

2.3.4 Fencing is to be permanently installed except where this either interferes with cargo handling operations or damage to the fencing is likely, in which case permanently attached folding or hinged fencing may be permitted. Removable fencing arrangements providing an equivalent level of protection will be specially considered.

2.3.5 The top rail of fencing is to have a height of at least 1000 mm from the base.

2.3.6 The intermediate rail(s) of fencing are to be positioned so that vertical spacings do not exceed 500 mm.

2.3.7 Fencing is to be of sufficient strength to prevent persons from falling and sufficiently robust to withstand operation.

2.3.8 Fittings for folding, hinged or removable fencing are to be robust and capable of ensuring that the fencing remains upright in operational use. Fasteners are to be captive to prevent their loss or fall.

2.3.9 Any non-rigid railing such as chain or wire rope is to have a sag at the mid-point between posts of not more than 150 mm. Wires are to be made taut by means of turnbuckles.

2.3.10 Where fencing forms part of a walkway that is subject to the requirements of the *International Convention on Load Lines* the requirements of that Convention are to be satisfied.

2.3.11 Toeboards are to be provided where persons below could be exposed to falling objects, such as around the sides of elevated lashing bridges and platforms, or where persons may be working near an edge.

2.4 Transit areas

2.4.1 Dimensions of transit areas are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

2.4.2 Walkways, transit areas, steps and ramps are to have anti-slip surfaces or coatings.

2.5 Movement between levels

2.5.1 Safe means are to be provided to enable movement between locations that are on different decks, or at different heights.

2.5.2 Ramps, steps or ladders are to be provided where the elevation changes abruptly by more than 300 mm.

2.5.3 Ladders should be provided to enable access to hatch coamings and pedestals where access is required for lashing operations.

2.5.4 Access openings which are situated in transit areas are to be protected by fencing.

2.6 Signs and indications

2.6.1 Deck obstructions, head-height obstructions and protrusions in access ways, such as cleats, ribs and brackets, that may give rise to a trip hazard are to be highlighted in a bright, conspicuous colour. Where necessary, warning signs are to be posted.

2.6.2 Changes in walkway height, edges, access openings and other fall or trip hazards (e.g. deck obstructions) are to be identified by yellow paint or black and yellow stripe hazard marking.

2.6.3 Openings that may present a trip or fall hazard should be highlighted in a contrasting colour around the rim of the opening.

2.6.4 Where necessary for safety, walkways on deck are to be delineated by painted lines or otherwise marked by signs.

2.6.5 Signs relating to safe access are to be pictorial where possible.

2.6.6 Where practicable, fences and handrails are to be highlighted with a contrasting colour to the background.

2.6.7 Any specific lashing requirements are to be displayed at or near to the lashing position.

2.7 Access openings

2.7.1 Where a fixed ladder gives access to a lashing position through an opening in the platform, the opening shall be protected with a hinged cover which can be closed after access. Alternatively, the opening is to be protected by fencing. Grabrails should be provided to ensure safe access through the opening.

2.7.2 Where covers are near vertical when in the open position, or where a handhold is fitted to the underside of the cover, the cover is to be fitted with a vertical locking dead-stop.

2.7.3 Access opening covers should preferably be gratings or equivalent rather than solid plates.

2.8 Ladders

2.8.1 Ladders with a potential fall height exceeding 6,0 m are to be fitted with a positive fall arrest device, such as safety rails or cables that can be secured to a safety harness.

2.8.2 Ladders with a potential fall height exceeding 3,0 m are to be provided, where possible, with safety cages.

2.8.3 Ladders from which a person may fall into a hold are to be provided, where possible, with safety cages.

2.8.4 Ladders are to be large enough for persons to safely enter and leave.

2.8.5 Handholds are to be provided at the top of ladders to enable safe access to the platform to be gained.

2.8.6 The upper rung is to be level with the platform or no more than 300 mm below the level of the platform.

2.8.7 Where a fixed ladder gives access to the outside of a lashing position, the stringers are to be connected at their extremities to the fencing of the lashing position, where practicable, irrespective of whether the ladder is sloping or vertical.

2.8.8 Where a fixed ladder gives access to a lashing position from the outside of the platform, the stringers of the ladder are to be opened above the platform level, where practicable, to give a clear width of between 700 mm to 750 mm.

2.8.9 Ladders are to be mounted at least 150 mm from the nearest permanent object at the back of the ladder.

2.8.10 Safety cages, where required, are to meet the following requirements:

(a) The distance from the ladder rung to the back of the safety cage is not to exceed 750 mm.

(b) Hoops are to be uniformly spaced at intervals not exceeding 900 mm.

- (c) Hoops are to be connected by vertical strips secured to the inside of the hoops, each equally spaced around the circumference of the hoop.
- (d) At the cage entrance, the distance from the ladder rung to the back of the safety cage may be increased to not more than 800 mm.
- (e) Where practicable, stringers are to be carried above the floor level of the platform by at least 1,0 m and the ends of the stringers are to be given lateral support.
- (f) The top step or rung is to be level with the floor of the platform unless the steps or rungs are fitted to the ends of the stringers.

2.9 Steps

2.9.1 No requirements for ECL(1).

2.10 Lashing bridges

2.10.1 No requirements for ECL(1).

2.11 Sightlines and signalling

2.11.1 No requirements for ECL(1).

2.12 Lashing equipment

- 2.12.1 Three high lashing rods are not permitted.
- 2.12.2 Extension pieces are not permitted. This requirement may be waived provided there is clear indication in the CSM.
- 2.12.3 Anchor points of turnbuckles should be positioned such that there is no bending of the lashing rods.
- 2.12.4 Stowage places, such as bins, are to be provided for lashing equipment.
- 2.12.5 Bins for defective lashing equipment are to be provided and clearly identified.
- 2.12.6 Stowage bins and their carriers should be designed and of sufficient strength to be lifted off the vessel and re-stowed.

2.13 Electrical requirements

2.13.1 Electrical arrangements and equipment are to satisfy the applicable requirements of *Pt 6, Ch 2 Electrical Engineering* of the Rules for Ships in addition to the requirements of this Section.

2.13.2 Lighting is to provide adequate illumination of walkways, transit areas, ladders, ramps and lashing positions. Account is to be taken of shadows created by containers which may be stowed in that area, for example different length containers in or over the work area. The illumination intensity should take into consideration the distance to the uppermost reaches where lashing equipment is utilised.

2.13.3 A separate lighting system is to be provided for each working space between container bays.

2.13.4 Lighting is to be permanently installed, where possible, and guarded against breakage.

2.13.5 Where lighting required by this Section is controlled by switches, the switches are to be readily accessible.

2.13.6 Reefer power outlets are to provide safe, watertight electrical connection.

2.13.7 Reefer power outlets are to be heavy duty and interlocked such that the outlet cannot be energised until a plug is fully engaged and the actuator rod has been pushed to the 'on' position. Pulling the actuator rod to the 'off' position must manually de-energise the circuit.

2.13.8 Reefer power outlets are to de-energise automatically if the plug is withdrawn while in the 'on' position. Also, the interlock mechanism must break the circuit while the pin and sleeve contacts are still engaged.

2.13.9 The design and positioning of reefer power outlets are to ensure that the Operator is not standing directly in front of the socket when switching takes place.

2.13.10 The positioning of reefer power outlets is to allow for cabling to be laid out without causing a trip hazard. The cables should be protected from lashing equipment falling on them during lashing operations.

2.14 Surveys

2.14.1 The arrangements and equipment referred to in these Rules, excluding loose container securing fittings, are to be examined and tested on completion of the installation and annually thereafter.

■ Section 3**Requirements for assignment of ECL(2)****3.1 General**

3.1.1 A ship designed to carry containers that is provided with safe access and securing arrangements in accordance with the requirements of *Ch 1, 1 General, Ch 1, 2 Requirements for assignment of ECL(1)* and *Ch 1, 3 Requirements for assignment of ECL(2)* of these Rules will be eligible to be assigned the special features notation **ECL(2)**.

3.1.2 The requirements of this Section are to be applied in addition to those defined in *Ch 1, 1 General* and *Ch 1, 2 Requirements for assignment of ECL(1)*.

3.1.3 Full-scale mock-up tests are to be carried out, representing all intended combinations of container sizes and locations and all intended lashing arrangements. Documentary evidence is to be provided to the Surveyor's satisfaction that the tests have been carried out.

3.2 Working areas

3.2.1 Dimensions of working areas are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

3.2.2 The height of working areas is to be compatible with the proposed stowage of containers.

3.2.3 Where lashing is from the hatch cover, a suitable platform should be provided, preferably at the same level as the top of the hatch cover.

3.2.4 Lashing positions are to be free of obstructions, such as piping, lashing gear, equipment, storage bins and hatch cover guides.

3.2.5 Working areas, excluding lashings in place, are to provide a clear sight of twistlock handles and allow for the manipulation of lashing gear.

3.3 Fall protection

3.3.1 The opening below the lowest course of intermediate fencing rails is not to exceed 230 mm and the opening between other courses is not to exceed 380 mm.

3.3.2 Stanchions are to be fitted about 1,5 m apart.

3.3.3 Gap closing devices are to return to the closed position when released, except where this would make them vulnerable to damage during container handling operations.

3.3.4 Where a rigid top rail of permanently installed fencing will interfere with movement, access or cargo-handling operations, lengths of chain may be accepted as the top rail provided they are fitted between two adjacent fixed stanchions or a similarly rigid structure spaced at not more than about 1,0 m apart.

3.3.5 Wire rope may be accepted as the top rail of folding, hinged or removable fencing, provided it is used only in limited lengths.

3.3.6 Toeboards should preferably be 150 mm high. Where this is not possible they are to be at least 100 mm high.

3.4 Transit areas

3.4.1 Dimensions of transit areas are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

3.4.2 The width of walkways and transit areas is to be at least 600 mm.

3.4.3 Vertical clearance of walkways and transit areas is to be at least 2,0 m.

3.4.4 Walkways and transit areas, as far as practicable, are to be free of obstructions, such as piping, lashing gear, equipment, storage bins and hatch cover guides.

3.5 Movement between levels

3.5.1 Access openings are not to be situated in transit areas unless unavoidable.

3.6 Signs and indications

3.6.1 No additional requirements for ECL(2), see Ch 1, 2.6 *Signs and indications*.

3.7 Access openings

3.7.1 Access openings are to be provided with adequate handholds.

3.7.2 Access openings are to be large enough for persons to safely enter and leave.

3.8 Ladders

3.8.1 Ladders with a potential fall height exceeding 3,0 m are to be provided with safety cages.

3.8.2 Ladders from which a person may fall into a hold are to be provided with safety cages.

3.8.3 Where it is necessary to ascend or descend by ladder between two or more decks, the ladders are to be offset at each deck, and protected by fencing at the top of each ladder.

3.8.4 Where a fixed ladder gives access to a lashing position through an opening in the platform, either an adequate handhold is to be provided on the platform, or the stringers are to be carried above the floor level of the platform by at least 1,0 m. The ends of the stringers are to be given lateral support. The top step or rung is to be level with the floor of the platform.

3.8.5 A fixed ladder should not slope at an angle greater than 25° from the vertical.

3.8.6 Where the slope of a ladder exceeds 15° from the vertical, the ladder is to be provided with suitable handrails not less than 540 mm apart, measured horizontally.

3.9 Steps

3.9.1 No requirements for ECL(2).

3.10 Lashing bridges

3.10.1 Dimensions of lashing bridges are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

3.10.2 Manhole openings at different levels of the lashing bridge should not be located directly below one another, as far as practicable.

3.10.3 Dimension 'C1', see *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*, defines the maximum horizontal reach from a lashing bridge when fitting or removing a lashing rod, thereby reducing the risk of back injury. Required dimension 'C1' may be increased where necessary, but should not exceed 1300 mm, provided there is clear indication in the CSM.

3.11 Sightlines and signalling

3.11.1 No requirements for ECL(2).

3.12 Lashing equipment

3.12.1 Dimensions of lashing and stowage arrangements are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

3.12.2 The maximum permissible length of lashing rod is that required, when standing at the stack foundation, to reach the bottom corner fitting of a 3rd tier container on top of two high-cube containers.

3.12.3 To prevent hand injury during tightening or un-tightening operations there is to be a minimum clearance of 70 mm around turnbuckles. This requirement may be waived provided there is clear indication in the CSM.

3.12.4 Turnbuckles are to incorporate a locking mechanism which will ensure that the lashing does not work loose during the voyage.

3.12.5 Lashing equipment stowage places are to be located in close proximity to the lashing positions and arranged so that the lashing equipment can be easily retrieved from the stowage location.

3.12.6 Bins are to be designed for ease of use and handling.

3.13 Electrical requirements

3.13.1 The level of lighting is to be even between one area and another.

3.13.2 Lighting is to be arranged to minimise glare to deck workers.

3.13.3 Minimum light levels are as follows:

- (a) Access routes – 10 lux.
- (b) Lashing positions – 50 lux.

3.14 Surveys

3.14.1 No additional requirements for ECL(2), see *Ch 1, 2.14 Surveys*.

■ Section 4

Requirements for assignment of ECL(3)

4.1 General

4.1.1 A ship designed to carry containers that is provided with safe access and securing arrangements in accordance with the requirements of *Ch 1, 1 General, Ch 1, 2 Requirements for assignment of ECL(1), Ch 1, 3 Requirements for assignment of ECL(2)* and *Ch 1, 4 Requirements for assignment of ECL(3)* of these Rules will be eligible to be assigned the special features notation **ECL(3)**.

4.1.2 The requirements of this Section are to be applied in addition to those defined in *Ch 1, 1 General, Ch 1, 2 Requirements for assignment of ECL(1)* and *Ch 1, 3 Requirements for assignment of ECL(2)*.

4.2 Working areas

4.2.1 Dimensions of working areas are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

4.2.2 The height of working areas is, in general, to be approximately level with the lashing plate to enable dimension 'E' in *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)* to be satisfied. A raised working platform may be necessary. See also *Ch 1, 2.12 Lashing equipment 2.12.3*.

4.2.3 Required dimension 'H' may be waived provided there is clear indication in the CSAP and at the position.

4.2.4 Working areas are to be increased as necessary where an access opening onto a working area would restrict the available working space.

4.3 Fall protection

4.3.1 Intermediate rails of fencing are to be in accordance with *Ch 1, 3.3 Fall protection 3.3.1*.

4.3.2 Fencing is to be capable of withstanding a force of at least 1,0 kN applied in any direction at mid-span of the top rail, or at the uppermost point if there is no top rail. Stanchions are to be capable of withstanding a force of at least 1,0 kN applied horizontally at the top in any direction.

4.3.3 Handrails for permanent fencing are to be rounded and easy to grasp.

4.3.4 The design of folding, hinged or removable fencing is to provide means to ensure that it is properly fitted and secured in place prior to accessing the protected space.

4.4 Transit areas

4.4.1 Dimensions of transit areas are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

4.4.2 Vertical clearance of walkways and transit areas is to be at least 2,1 m. Vertical clearance of not less than 2,0 m may be accepted provided there is clear indication in the CSAP and at the position.

4.4.3 Required dimension 'H' may be waived provided there is clear indication in the CSAP and at the position.

4.5 Movement between levels

4.5.1 Trip hazards and small changes in elevation are to be avoided.

4.5.2 Angles of ascent for ramps, steps and ladders are to be in accordance with *Table 1.4.1 Angles of ascent*.

Table 1.4.1 Angles of ascent

Description	Angle	
Ramps	7° – 15°	from horizontal
Steps	30° – 50°	from horizontal
Ladders	0° – 25°	from vertical

4.5.3 Doors are to open inwards and away from the change of height where this is not in conflict with any escape requirements.

4.5.4 Where there is a direct line between the doorway and the steps or ladder, additional fall protection is to be provided between the doorway and the steps or ladder.

4.6 Signs and indications

4.6.1 Where access openings open into transit or working areas, warning signs are to be displayed on the underside of the cover or at another appropriate prominent place.

4.6.2 Where it is necessary to locate steps or ladders directly behind doors, a warning sign is to be provided on the door.

4.7 Access openings

4.7.1 An access opening giving access to a ladder is to have a clear opening, where practicable, of not less than 600 mm by 600 mm. There is to be a clear space of at least 400 mm either side of the opening, and preferably on all sides, to allow easy access.

4.8 Ladders

4.8.1 Ladders of height exceeding 3,0 m from which a person may fall overboard are to be provided, where possible, with safety cages. Alternatively, a positive fall arrest device should be provided, such as safety rails or cables that can be secured to a safety harness.

4.8.2 The vertical height of a ladder is not to exceed 9,0 m. Where the difference in levels is greater than 9,0 m, intermediate landings and multiple ladder runs of equal length are to be provided.

4.8.3 There is to be no change in direction of a ladder without an intermediate landing.

4.8.4 Landings between ladders are to be not less than 600 mm in width. Landings at the top and bottom of inclined ladders are to be at least 760 mm in length.

4.8.5 Stair ladders are not recommended and will be specially considered.

4.8.6 Ladders are not to interfere with the opening and closing of hatches and doors.

4.8.7 Where it is intended that ladders are to be climbed from one side only, the opposite side of the ladder is to have a barrier.

4.8.8 Ladder rungs are to be at least 410 mm in width, and are to be slip-resistant or of grid/mesh construction.

4.8.9 If ladder rungs are of round cross-section, the diameter is to be at least 25 mm. If ladder rungs are of square cross-section, the sides are to be a minimum of 25 mm.

4.8.10 The vertical spacing of ladder rungs is to be uniform and between 275 mm and 300 mm apart.

4.8.11 Ladders are to be mounted at least 205 mm from the nearest permanent object at the back of the ladder.

4.8.12 There is to be at least 760 mm clearance in front of a ladder for climbing space.

4.8.13 Ladders that lead to hatches or passageways are to have horizontal or vertical handgrabs that extend at least 1,0 m, where possible, above the level or landing platform served by the ladder.

4.8.14 Safety cages are to be constructed in accordance with 2.8.10 and the following additional requirements:

- (a) The vertical strips connecting the hoops are to be spaced at intervals not more than 240 mm.
- (b) Safety cages are to start at a height of 2,1 m above the deck.

4.9 Steps

4.9.1 Steps are to have appropriate slope, spacing, width and size of tread. Wherever possible the slope for steps is to be 38° from the horizontal, with a tread height of 170 mm, a depth of 290 mm and step width of at least 710 mm.

4.9.2 A vertical clearance of at least 2,1 m is to be provided above all steps.

4.9.3 A clear landing at least as wide as the tread width and a minimum of 915 mm long is to be provided at the top and bottom steps.

4.9.4 A continuous handrail is to be provided on all steps.

4.9.5 The height of the top handrail for steps is to be between 910 mm and 990 mm, with 940 mm preferred.

4.9.6 Handrails for steps are to be rounded and easy to grasp.

4.10 Lashing bridges

4.10.1 Where lashing rods are to be stowed on the lashing bridge walkway, the storage area is to be provided with hoops or equivalent.

4.10.2 Where lashing rods are to be stowed in the space between the lashing bridge and the container stack, the arrangements are to prevent the rods becoming trapped or difficult to access when containers are secured.

4.10.3 Access opening covers are to be gratings or equivalent rather than solid plates.

4.10.4 Hooks to secure turnbuckles during unloading/loading are to be provided on the fencing. The design of hook is to ensure that the turnbuckle will not fall out accidentally.

4.11 Sightlines and signalling

4.11.1 Where sightlines necessitate the use of a signaller, provision is to be made for a safe operating area on deck and fall protection provided as necessary.

4.12 Lashing equipment

4.12.1 Dimensions of lashing and stowage arrangements are to be in accordance with *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)*.

4.12.2 Lashing equipment is to be easy to use, inspect and maintain. Lashing equipment is to be such that the condition may be determined by visual inspection.

4.12.3 The length and weight of lashing rods are to be such that the Operator is to be able to fit and remove the rods without reaching above shoulder height. *Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)* Dimension 'E' defines the maximum height to which a lashing rod may be lifted while inserting into the container corner casting. Required dimension 'E' may be waived provided there is clear indication in the CSM and at the lashing position.

4.12.4 Lashing equipment for use at the twenty foot 'ISO gap' position should be stored at that location, not at the forty foot position. This requirement may be waived provided there is clear indication in the CSM.

4.13 Electrical requirements

4.13.1 Lighting arrangements for cargo operations are to be appropriate for the activities to be carried out, e.g. container securing points as well as the working area.

4.13.2 The level of lighting is to be sufficient to enable obvious damage to, or leakage from, containers to be seen.

4.13.3 The level of lighting is to be sufficient to read labels or container plates or to distinguish between them where required, or provision is to be made for other means of illumination. Alternative lighting arrangements providing an equivalent level of illumination may be specially considered.

4.13.4 Openings in deck surfaces and walkways are to be illuminated, see *Ch 1, 4.13 Electrical requirements 4.13.8*.

4.13.5 Warning signs are to be illuminated sufficiently to readily identify the sign and to read its content, day and night.

4.13.6 Light fittings are to be accessible for maintenance.

4.13.7 Where it is proposed to use portable (wander) lights to satisfy the requirements of this Section, the arrangements are to be provided with:

- Dedicated socket-outlets satisfying the requirements of *Pt 6, Ch 2, 12.6 Charging facilities* of the Rules for Ships;
- Secure mounting locations to provide the required lighting;

- (c) Means to locate light cables such that they will not be damaged or present a hazard when mounted; and
- (d) Dedicated storage area for the lights when not mounted.

4.13.8 Minimum light levels are as follows;

- (a) Where the dangers of tripping or falling are greater than usual – 30 lux.
- (b) Where inspecting and repairing lashing equipment – 540 lux.

4.14 Surveys

4.14.1 No additional requirements for ECL(3), see Ch 1, 2.14 Surveys.

■ Section 5

Tables and Figures

5.1 General

5.1.1 The Figures and Tables in this Section contain requirements relating to ECL(1), ECL(2) and ECL(3) as indicated.

Table 1.5.1 Container securing dimensions - ECL(1), ECL(2) and ECL(3)

Dimension	Description	Requirement	Applicable to Notation		
		(mm)	ECL(1)	ECL(2)	ECL(3)
(see Figure 1.5.1 Side view of working area between container stacks on hatch cover)					
D	Height of fencing on lashing bridge and working platforms	1000 minimum	✓	✓	✓
L	Horizontal gap in fall protection	300 maximum	✓	✓	✓
GL	Width of working platform for outboard lashing – fore/aft	750 minimum	✓	✓	✓
GT	Width of working platform for outboard lashing – transverse	750 minimum	✓	✓	✓
A	Width of work area between container stacks	750 minimum		✓	✓
B	Distance between lashings on deck or on hatch covers	600 minimum		✓	✓
C1	Distance from lashing bridge fencing to container stack	1100 maximum		✓	✓
C2	Distance from lashing plate to container stack (lashing bridge)	220 minimum		✓	✓
C3	Distance from lashing plate to container stack (elsewhere)	130 minimum		✓	✓
F	Width of lashing bridge between top rails of fencing	750 minimum		✓	✓
F1	Width of lashing bridge between storage racks, lashing cleats and any other obstruction	600 minimum		✓	✓
I	Width of work platform at end of hatch cover or adjacent to superstructure	750 minimum		✓	✓
J	Distance from edge of hatch cover to fencing	600 minimum		✓	✓
K	Width of lashing bridge between top rails of fencing	750 minimum		✓	✓
K1	Width of lashing bridge between the pillars of the lashing bridge	600 minimum		✓	✓
E	Vertical distance from working level to lower end of lashing rod: • Single height rod • Double height rod	1600 maximum 1400 maximum			✓
H	Gap in access or working surface	60 maximum			✓

NOTES

L - See Ch 1, 2.3 Fall protection 2.3.2. For example, see Figure 1.5.3 Outboard working area.

GL - Measured from end of container to inside of fencing.

GT - Measured to inside of fencing.

B - Measured between the centres of the lashing plates.

C1 - Measured from inside of fencing. May be increased where necessary, but not to exceed 1300 mm, provided there is clear indication in the CSM, see Ch 1, 3.10 Lashing bridges 3.10.3.

C2, C3 - Measured from centre of lashing plate to end of container.

F, K - Measured to inside of fencing.

I - Measured to inside of fencing.

J - Measured to inside of fencing.

E - Measured to lower end of lashing rod. This may be measured with the lashing rod in the position when the upper end of the rod is being inserted or withdrawn from the container corner casting, i.e. upper and lower ends of the rod at approximately the same transverse distance from the centreline of the vessel. May be waived provided there is clear indication in the CSM and at the lashing position, see Ch 1, 4.12 Lashing equipment 4.12.3.

H - To prevent tripping and to prevent feet becoming trapped in the gap. May be waived provided there is clear indication in the CSAP and at the position, see Ch 1, 4.2 Working areas 4.2.3 and Ch 1, 4.4 Transit areas 4.4.3.

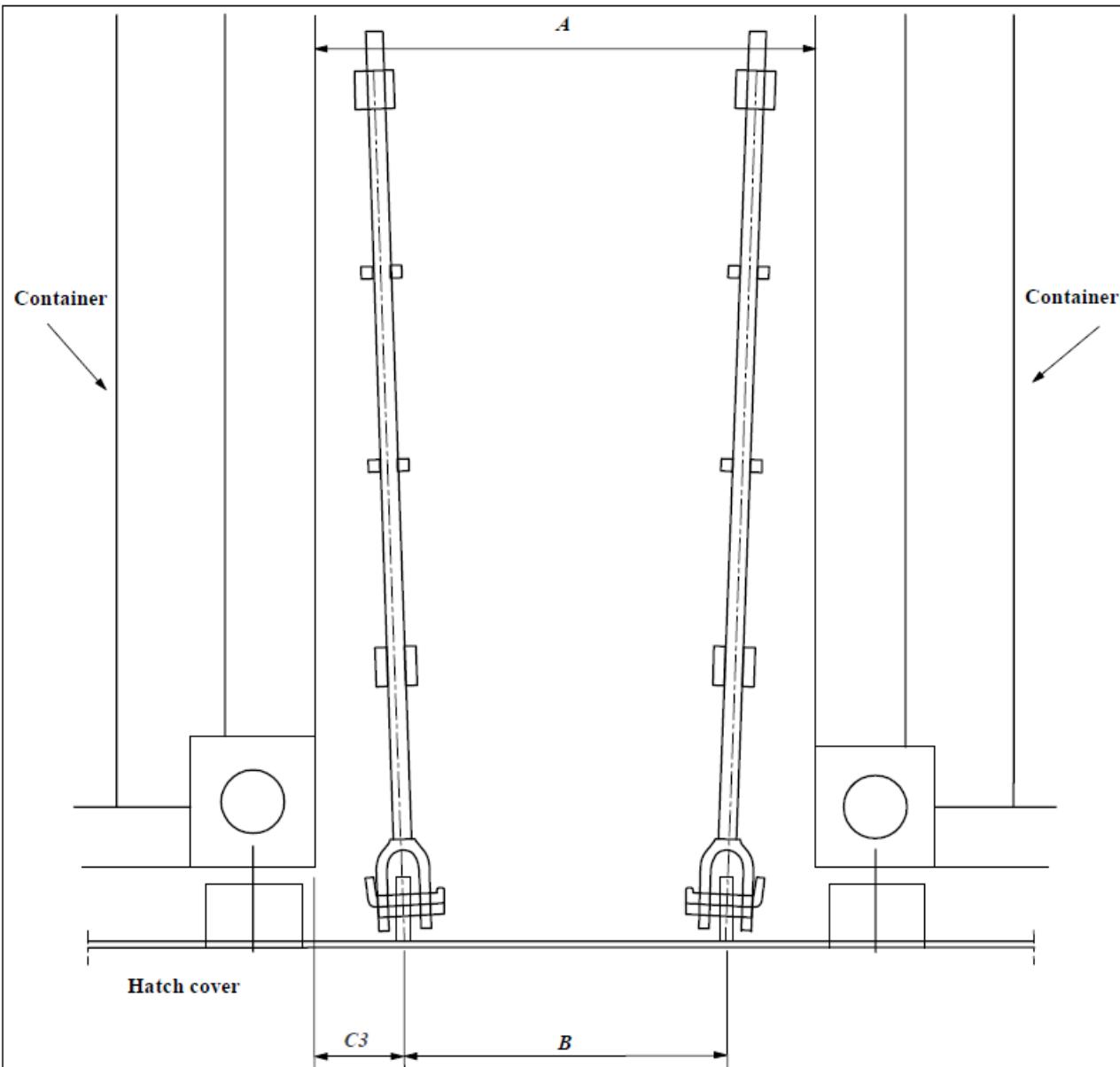


Figure 1.5.1 Side view of working area between container stacks on hatch cover

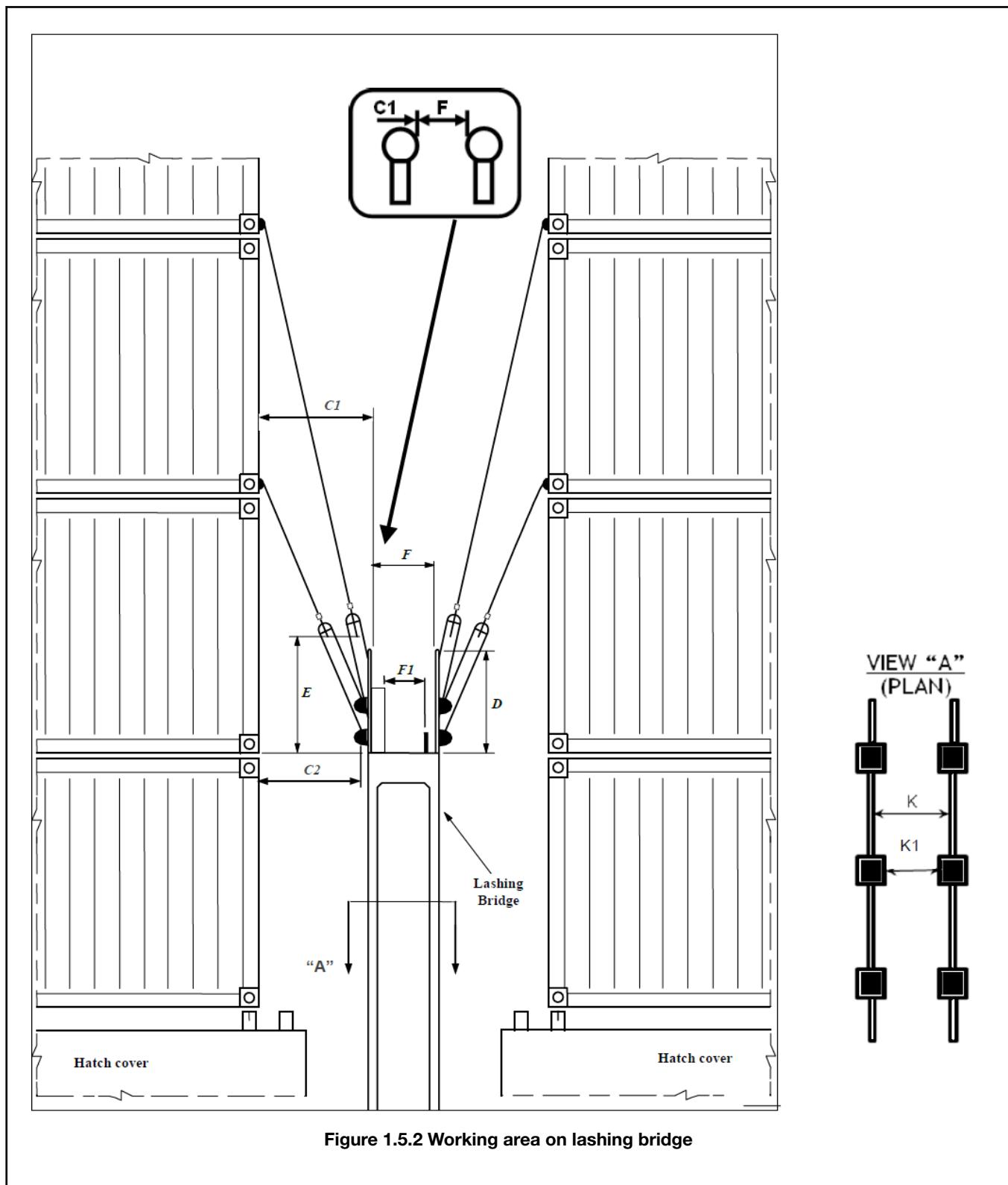
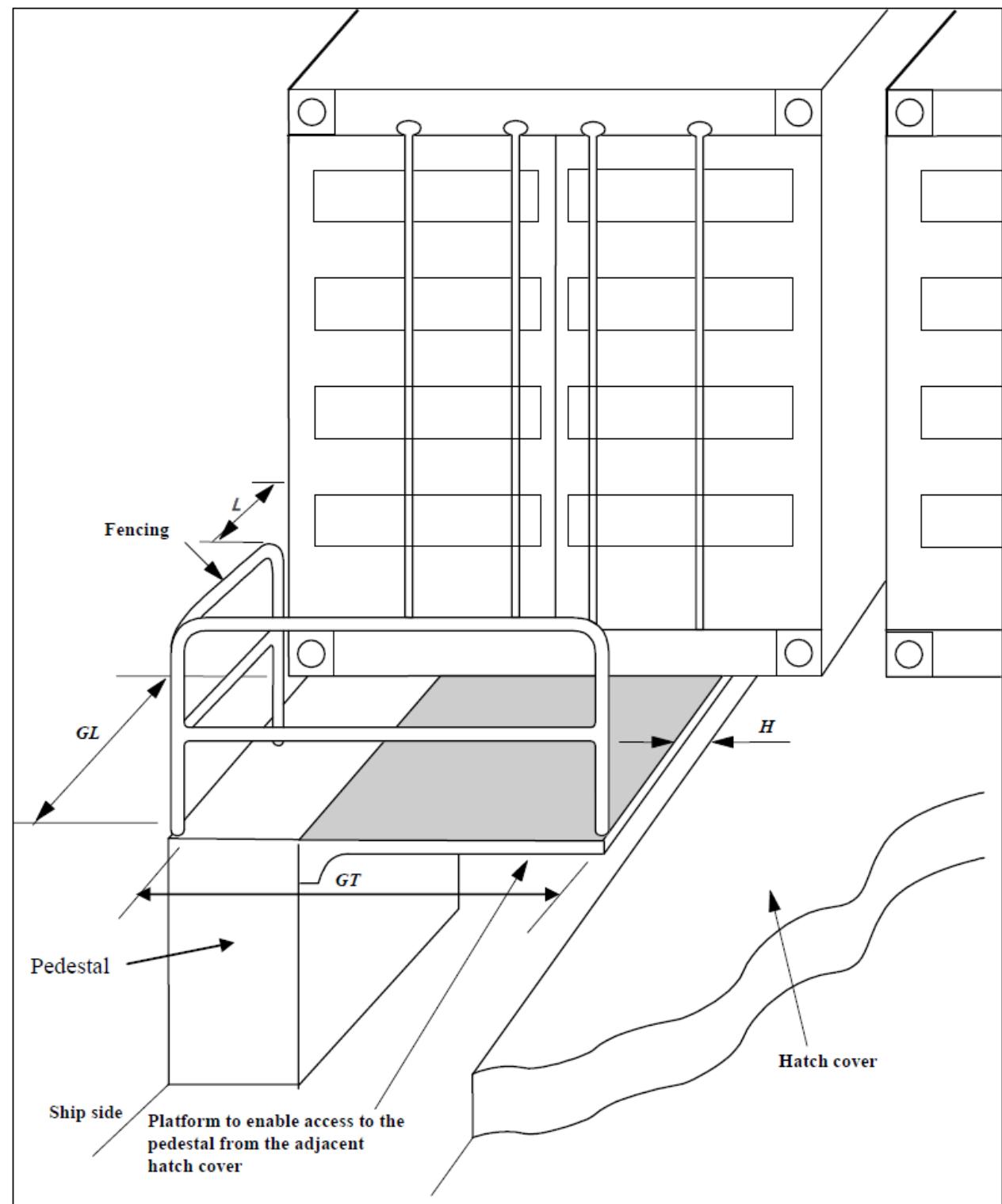


Figure 1.5.2 Working area on lashing bridge

**Figure 1.5.3 Outboard working area**

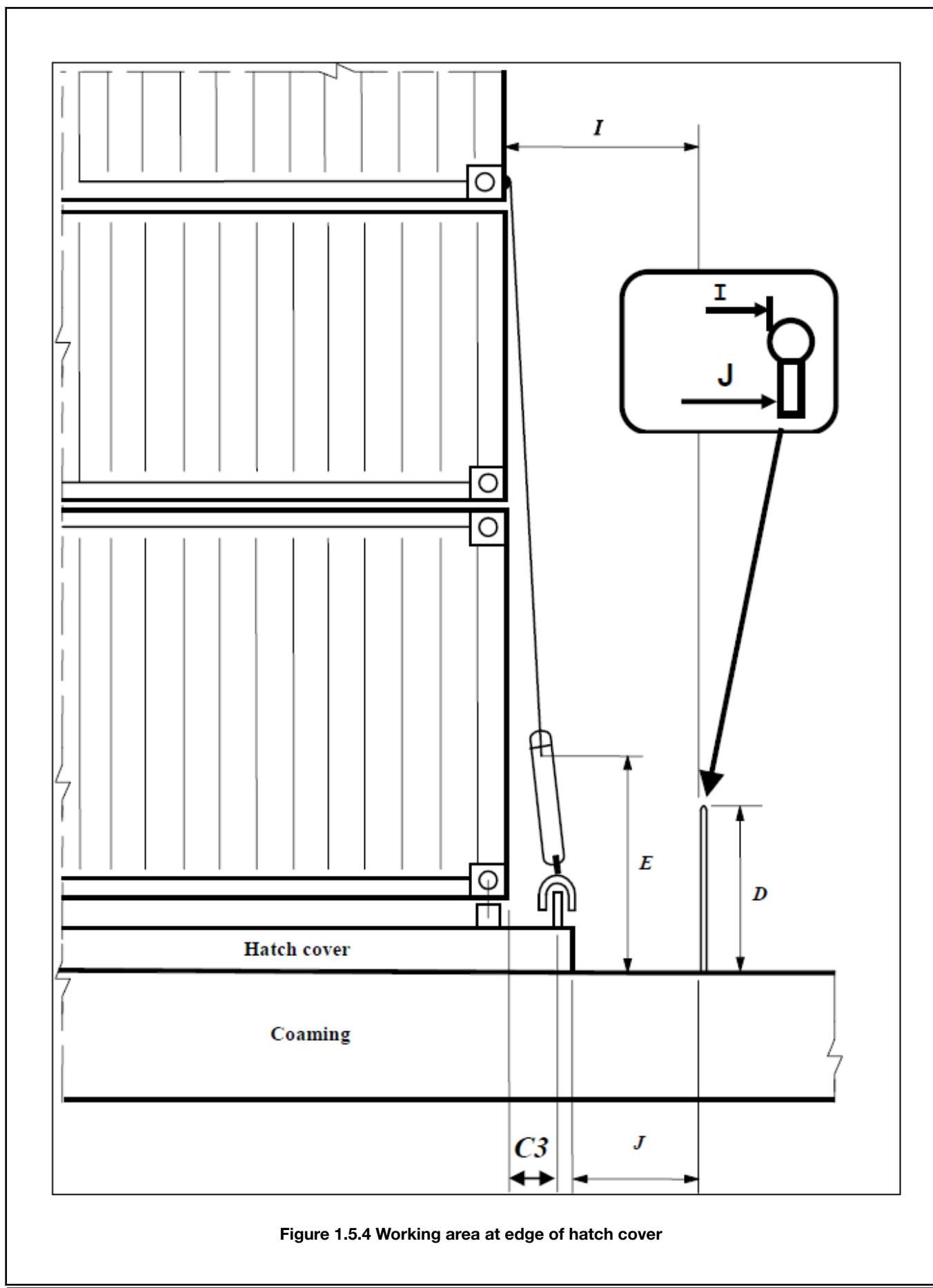


Figure 1.5.4 Working area at edge of hatch cover

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